

Notice of Allowability

Application No.

10/669,327

Examiner

Hoai-An D. Nguyen

Applicant(s)

IMAI ET AL.

Art Unit

2858

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to _____.
2. ☒ The allowed claim(s) is/are 1-6.
3. ☒ The drawings filed on 25 September 2003 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

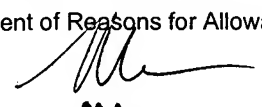
* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 09252003
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.


N. Le
Supervisory Patent Examiner
Technology Center 2800

REASONS FOR ALLOWANCE

1. Claims 1-6 are allowed.
2. The following is an examiner's statement of reasons for allowance:

With regard to claim 1, the prior art does not teach or render obvious the combinations as claimed rotor angle detecting apparatus for a DC brushless motor, including:

- An inspection voltage imposing unit for imposing an inspection voltage on the drive voltage, the inspection voltage being generated by multiplying fundamental voltage string data in which a certain voltage output pattern in a predetermined period is set by a modulation coefficient whose value changes on every predetermined period; and
- A reference value calculating unit for making reference to a detected current of the current detecting in a predetermined control cycle within the predetermined period when the inspection voltage is imposed on the drive voltage by the inspection voltage imposing unit and then calculating a sine reference value corresponding a sine value of an angle which is twice a rotor angle of the motor and a cosine reference value corresponding to a cosine value of the angle which is twice the rotor angle of the motor based on a variation of the detected current detected by the current detecting unit in each control cycle, the fundamental current string data and the modulation coefficient.

With regard to claim 2, the prior art does not teach or render obvious the combinations as claimed rotor angle detecting apparatus for a DC brushless motor, including:

- An inspection voltage imposing unit for imposing an inspection voltage on the d-axis voltage and q-axis voltage, the inspection voltage being generated by multiplying fundamental voltage string data in which a certain voltage output pattern in a predetermined period is set by a modulation coefficient whose value changes on every predetermined period; and
- A reference value calculating unit for making reference to the d-axis actual current and the q-axis actual current in a predetermined control cycle within the predetermined period when the inspection voltage is imposed on the d-axis voltage and the q-axis voltage by the inspection voltage imposing unit and then calculating a sine reference value corresponding to a sine value of an angle which is twice a phase difference $(\theta - \theta^{\wedge})$ between an actual value (θ) and an estimated value (θ^{\wedge}) of the rotor angle of the motor and a cosine reference value corresponding to a cosine value of the angle which is twice the phase difference $(\theta - \theta^{\wedge})$ based on variations of the d-axis actual current and the q-axis actual current in each control cycle, the fundamental current string data and the modulation coefficient.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

CONTACT INFORMATION

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hoai-An D. Nguyen whose telephone number is 571-272-2170. The examiner can normally be reached on M-F (8:00 - 5:30) First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lefkowitz can be reached on 571-272-2180. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Hoai-An D. Nguyen
Examiner
Art Unit 2858
HADN

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